Original Article

Role of National Accreditation Board of Hospitals and Healthcare Providers (NABH) core indicators monitoring in quality and safety of blood transfusion

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Abstract:

Context: Certain quality indicators are mandatory in the maintenance and improvement of quality in blood transfusion. Monitoring of such indicators should be done regularly and deficiencies are to be corrected for effective blood transfusion services. **Aims:** To study the usefulness of monitoring of the National Accreditation Board for Hospitals and Healthcare Providers (NABH) core indicators in blood transfusion and in the maintenance of hemovigilance. **Settings and Design:** Hemovigilance is a "quality process" to improve quality and increase the safety of blood transfusion. It covers and surveys all activities of the blood transfusion chain from donors to recipients. Core indicators' monitoring is a part of the hemovigilance process. **Materials and Methods:** A 2-year retrospective study was conducted in a blood storage unit of a NABH accredited tertiary care hospital of a metropolitan city. Four NABH core indicators in blood transfusion were observed and monitored by the clinical and blood storage unit staff of different levels. **Results:** It was observed that there was an improvement in quality by core indicators monitoring with decreased wastage of blood and blood components, decreased average turnaround time for issue of blood and blood components, and lesser number of transfusion reactions. **Conclusion:** This study demonstrated that monitoring of NABH core indicators results in the enhancement of quality and safety in blood transfusion services, reducing the incidence of transfusion reactions.

Key words:

Core indicators, hemovigilance, National Accreditation Board for Hospitals and Healthcare Providers (NABH)

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Introduction

This study was conducted to identify the effectiveness of core indicators' monitoring in a blood storage unit of a National Accreditation Board for Hospitals and Healthcare Providers (NABH) accredited tertiary care hospital. Four core indicators were observed and monitored monthly, which were:

1. Percentage (%) of blood component usage,
2. Percentage (%) of transfusion reactions,
3. Percentage (%) of wastage of blood and blood components, and
4. Average turnaround time for issue of blood and blood components.[1]

The information was gathered in a structured manner and then, adverse events associated with the transfusion were reported. The root causes were analyzed and specified corrective and preventive actions were taken.

Materials and Methods

A total of four parameters were observed in all the wards, intensive care units, and operation theaters of a NABH accredited tertiary care neurosciences institute for a period of 2 years that included 2011 and 2012. The study parameters included whole blood and blood component usage, transfusion reactions, wastage of blood and blood products, and the average turnaround time for issue of blood and blood components. These were documented monthly by the concerned clinical staff that included the nursing staff and doctors of clinical departments in a specific *proforma* [Annexure 1]. This information was then collected by the blood storage unit technician and counterchecked by the resident doctor of the blood storage unit. The whole process was supervised by the in-charge of the blood

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Annexure 1: *Proforma* of Mandatory Indicators Report (Blood Transfusion)

Month: _____ Ward: _____

Sl. No.	Name of indicators	Number of cases*	
		Numerator	Denominator
1.	No. of transfusion reactions		
2.	No. of wastage of blood and blood products		
3.	No. of blood components used		
4.	Turnaround time for issue of blood and blood components		

Sl. No.	Name	Age/Sex	CRF No.	No. of blood and blood components used	Transfusion reaction if any	Time of start of BT	Time of completion of BT	Date of transfusion

BT: Blood transfusion

Signature of nursing sister: _____

Name of nursing sister: _____

storage unit. All the staff involved in the blood transfusion chain was provided adequate and timely training and education on hemovigilance. Percentages of these parameters were derived by various formulae:[1]

1. Percentage of the blood components used was derived by taking the total number of blood components used and dividing it by the total number of blood units used including both whole blood and blood components and then taking its percentage by multiplying with 100.
   $\frac{\text{Number of components used}}{\text{Number of blood units including both whole blood and the blood components used.}} \times 100$.
2. Percentage of transfusion reactions is derived by dividing the number of transfusion reactions by the total number of transfusions in that particular month and multiplying by 100.
   $\frac{\text{Number of transfusion reactions}}{\text{Number of transfusions.}} \times 100$.
3. Percentage of wastage of blood and blood components was derived by dividing the number of blood and blood products discarded or wasted (not used) by the total number of blood and blood products indented from the blood bank in case of the hospital not having a blood bank of its own and multiplying it by 100.
   $\frac{\text{Number of blood and blood products discarded or wasted}}{\text{Number of blood and blood products indented from the blood bank.}} \times 100$.
4. Average turnaround time for issue of blood and blood components was the time that begins when the order was raised to blood and blood component reaching the clinical unit.

Depending on the documented information, a core indicators' review meeting involving the concerned officials was conducted regularly wherein the indicators were discussed in detail, along with root cause analysis. Accordingly, requisite corrective and preventive action plan were formulated to fill in the gaps in blood transfusion and communicated to the staff of the clinical departments.

The patient or patient's attendant also filled a survey (feedback) form [Annexure 2] after completion of blood transfusion to know the satisfactoriness of the blood transfusion process and was sent to the blood storage unit.

Results

The percentage of these four parameters was calculated monthly for 2 years, 2011 and 2012 as shown in Tables 1 and 2. These values were intercompared and various trends in these parameters were analyzed in the backdrop of clinical utility and required actions were taken to improve blood transfusion.

The following observations were made: Table 1 showed that in the year 2011, the mean usage was 85.41%. The usage of blood and blood components was comparatively less in the months of February (75%), March (67.5%), April (87.5%), June (50%), August (70%), and October (75%) with increased wastage of blood in these months as 25%, 32.5%, 12.5%, 50%, 30%, and 25%, respectively. The mean wastage was 14.58%. Transfusion reaction, which was a nonhemolytic transfusion reaction, was reported in 1 out of 16 patients (6.25%) in the month of August, caused due to mismatch. Average turnaround time for the issue of blood and blood components was 4.0 h. These results were analyzed for root causes and corrective actions were taken.

Table 2 showed that in the year 2012, mean usage was 97.38%. The usage of blood and blood components improved in most of the months with comparatively less usage in the months of January (85.8%), March (90.5%), and May (92.3%) when the wastage of blood was 14.2%, 9.5%, 7.7%, and 12.5%, respectively, and the mean wastage was 2.61%. The maximum wastage was 14.25% that was reported in January 2012, which was very low as compared to the maximum wastage that occurred in June 2011 (50%). The number of transfusion reactions was nil and the average turnaround time for the issue of blood and blood components was 2.55 h.

Annexure 2: Patient Survey Form

Blood transfusion

You are requested to go through the following questionnaire and try to answer the question with an open mind and in clean handwriting as per the instructions given. The information marked as * is optional and if you so desire, you may not respond to it. This not a complaint form and the activity has been planned with the idea of improving our services to make your consultation at IHBAS† a memorable experience.

†IHBAS: Institute of Human Behavior and Allied Sciences

***NAME:**

AGE:

***ADDRESS:**

TELEPHONE NO.:

SERVICES TAKEN FROM IHBAS:

DATE:

***HOSPITAL REGISTRATION NO.:**

(Please tick only one answer for each of the following questions)

Sl. No.	Questions	Yes	No
	Are you aware of the availability of blood transfusion services at IHBAS†?		
	Do you feel that information about Blood Transfusion was complete and clear?		
	Was the staff responsive to your queries?		
	Did you face any problem in procuring blood and blood components at any level?		
	Do you feel motivated about blood donation?		
	Did you get a copy of patient information booklet/pamphlet about blood transfusion		
	Was there any problem to the patient after blood transfusion?		

†IHBAS: Institute of Human Behavior and Allied Sciences

Table 1: Showing monthly data of four quality core indicators for the year 2011

Indicator	Blood component usage (%)	Transfusion reactions	Wastage of blood and blood products	Average turnaround time for issue of blood and blood components
January	100	00	00	4.5 h
February	75	00	25%	4 h
March	67.5	00	32.5%	3.5 h
April	87.5	00	12.5%	4 h
May	100	00	00	3.9 h
June	50	00	50%	3.5 h
July	100	00	00	3 h
August	70	6.25%	30%	2.5 h
September	100	00	00	3 h
October	75	00	25%	2.5 h
November	100	00	00	2.26 h
December	100	00	00	7 h

Table 2: Showing monthly data of four quality core indicators for the year 2012

Indicator	Blood component usage (%)	Transfusion reactions	Wastage of blood and blood products	Average turnaround time for issue of blood and blood components
January	85.8	00	14.2%	2 h
February	100	00	00	3 h
March	90.5	00	9.5%	2 h
April	100	00	00	2.45 h
May	92.3	00	7.7%	2.83 h
June	100	00	00	2.48 h
July	100	00	00	3.4 h
August	100	00	00	2.37 h
September	100	00	00	2.23h
October	100	00	00	2.25 h
November	100	00	00	3.6 h
December	100	00	00	2 h

According to the patient survey forms received in the blood storage unit, 99.5% of the total blood transfusions were satisfactory.

Discussion

The accreditation program by the NABH strives to maintain the quality and safety of collecting, processing, testing, and transfusing of blood and blood products. The basis for maintenance of quality in blood banking includes compliance with the accreditation standards and guidelines set by the National AIDS Control Organization (NACO).[2]

The quality indicator is a measure of transfusion practice and traceability including confirmation of transfusion and it shall be defined. The indicators' data should be collected and analyzed on a regular basis for quality improvement.[3] According to the objective element (f) of Standard-Continuous Quality Improvement 3 of NABH, some key performance indicators have been mentioned as mandatory for the monitoring of blood and blood products transfusion, which are:

1. Percentage (%) of the blood component usage,
2. Percentage (%) of transfusion reactions, which is defined as any adverse reaction to the transfusion of blood or blood components that may range from an allergic reaction to a life-threatening complication such as transfusion-related acute lung injury (TRALI) and graft versus host disease (GVHD),
3. Percentage of wastage of blood and blood components, which include blood products found unfit for use, and
4. Average turnaround time for the issue of blood and blood components.[1] As this study was conducted in a NABH accredited institute, NABH core indicators were strictly followed for improvement in blood banking.

These core indicators are a part of the hemovigilance process. Hemovigilance is indispensable when it comes to the safety and quality of blood transfusions.[4] The objective of hemovigilance, a set of surveillance procedures covering the complete transfusion chain, is to collect and assess information concerning unexpected and undesirable effects arising from the use of blood and blood products and to prevent the recurrence of such incidents.[5] A centralized hemovigilance program was launched for the first time in India on Dec 10, 2012 in 60 medical colleges in the first phase. The National Institute of Biologicals (NIB) will be the National Coordinating Centre for Haemovigilance. This program will be implemented under the overall ambit of the Pharmacovigilance Program of India (PvPI), which is being coordinated by the Indian Pharmacopoeia Commission (IPC).[6]

Some earlier studies explained the utility of monitoring of core indicators in transfusion medicine. Mwangi (2009) advocated that hemovigilance data had given transfusion services a clear understanding of problems associated with transfusion that need to be solved so as to improve transfusion safety.[7] Dhingra (2004) conducted a study on the challenges in global blood safety and presented the World Health Organization's (WHO) integrated strategy for blood safety. This provided invaluable information on the current status of the global blood supply, identifying problems and prioritizing needs, and was useful in monitoring progress and trends.[8] Ayob (2010) also concluded that hemovigilance program required expertise and resources that should be utilized to correct deficiencies that were already apparent and obvious. The data collected should be accurate and should be used in formulating guidelines, standards, and policies, and to affect appropriate interventions.[9] Similarly, Arewa (2009) also explained that a system of hemovigilance if incorporated into the blood transfusion service would promote effective monitoring of blood transfusion and reduce wastage of scarce blood/blood products.[10] Jain and Kaur (2012) proved that a well-functioning hemovigilance system could be used as quality indicator for monitoring the blood transfusion safety, and also contribute significantly to evidence-based transfusion medicine.[11]

Now, we explain our own results as follows: The mean usage of blood and blood products was low (85.41%) in the year 2011 as compared to that in the year 2012 (97.38%). The efforts were directed toward increasing usage by the training of clinical staff. Promotion of voluntary blood donation was done by distribution of educational materials with the message of blood donation both in Hindi and English in the outpatient departments (OPDs), wards, intensive care unit (ICU), and emergencies. Blood donation camps were organized and at the same time, clinicians were advised to raise the demand of blood and blood products judiciously as unnecessary blood transfusion has its own side effects.

In the year 2011, the mean wastage was 14.58%; the root causes for increased wastage of blood and blood products were analyzed and these causative factors were noticed:

1. Nonjudicious demand of blood and blood components raised rather than the actual number of whole blood and blood components units required,
2. Issue of blood bags several hours before surgery,
3. Improper storage of blood at room temperature or in refrigerated containers,
4. Request for blood bag containing 450 mL blood in case of pediatric patients,
5. Any transfusion reaction or if the patient felt uneasy during the transfusion procedure where blood transfusion had to be stopped immediately and the remaining blood got wasted.

Also, as per the policy of blood banks/blood storage unit if blood or blood products remained unused for more than half an hour at room temperature, they were not taken back by the blood storage unit and accounted for wastage. Occasional failure in the following of first-in, first-out (FIFO) policy[12] at the blood storage area also leads to wastage of blood. The corrective and preventive actions (CAPAs) were taken to avoid wastage such as the issue of blood only at the time of need, issue of pediatric blood bags to pediatric patients only, and stringent following of FIFO policy by the blood storage unit staff. Most significantly, education of all the clinical and nursing staff was imparted in relation to sending blood requisition for issue of blood from the blood storage unit to all needy patients as and when required and to continuously improve the quality and patient's satisfaction.

Ness *et al.* (1990) conducted a study on the differentiation of delayed serologic and delayed hemolytic transfusion reactions: incidence, long-term serologic findings, and clinical significance. He indicated that transfusion complication could only be adequately addressed by an active prospective surveillance program. Elements of bedside monitoring and blood bank review must be incorporated. Monitoring for transfusion complications

is important as a means of improving patient care and designing research priorities. Thus, hemovigilance requires an integrated approach involving the clinical staff, blood bank, and external reviews.[13] Global consultation on hemovigilance recommended that the mechanisms of reporting adverse transfusion events (reactions and incidents) that include adverse transfusion reaction form and incident reporting form should be developed. Protocol for further investigation of transfusion reactions should be defined. Clear roles and responsibilities for reporting should be specified. Follow-up and regular review of adverse reaction and incidents by the hospital transfusion committee (HTC) should be done.[3]

Hussain (2014) performed a clinical audit on reporting of transfusion reactions as a quality indicator and reported that febrile nonhemolytic transfusion reactions were the most common.[14] In the year 2011, one case of transfusion reaction was reported, which was a nonhemolytic transfusion reaction due to mismatch. Then in 2012, transfusion reactions were reduced by taking a few preventive actions: clerical errors were avoided leading to all types of mismatch and proper identification of patients was done, which was followed by more rigorously, double checking of labeling of the blood samples for blood grouping and cross-matching. Proper identification of the recipient and blood bag was done at the time of start of transfusion and it was followed with careful and close observation of the patient during transfusion. Unnecessary blood transfusion was avoided.

The root causes for increased average turnaround time for the routine issue of blood and blood components, which is the time that begins when the order is raised to blood and blood component reaching the clinical unit, were analyzed. It was found that distribution of educational material and brochures about the need of blood donation, training and education of the clinical staff including the ward sister in charge, senior nursing staff, and doctors of clinical departments were done. Also, the technical staff of the blood storage unit was trained to act promptly when they received the requisition form regarding the demand of blood and blood components. They were also trained to maintain quality at each step from blood procurement from the mother blood bank to blood issue and to monitor and adhere to the laid down standards in drug and cosmetic rules. All this helped in reducing the turnaround time in the year 2012.

Although the study was conducted in a nascent blood storage center where the consumption of blood and blood components is not too high, the data generated were sufficient to conclude that NABH core indicators' monitoring is a comprehensive approach to collect and analyze data to address the issues of transfusion reactions and adverse events associated with blood transfusion by generating corrective and preventive actions for transfusion safety.

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Conflicts of interest

There are no conflicts of interest.

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